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ASSOCIATION OF *URSUS ARCTOS* AND *ARCTODUS SIMUS* (MAMMALIA: URSIDAE) IN THE LATE PLEISTOCENE OF WYOMING

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Abstract. The first substantiated association of *Ursus arctos* and *Arctodus simus* (Mammalia: Ursidae) from a local fauna south of Alaska is reported from Little Box Elder Cave, a late Pleistocene site in Converse County, Wyoming. *Ursus arctos,* the grizzly or brown bear, entered the area from Alaska at the end of the Wisconsin glaciation, and may have been a factor in the extinction of *Arctodus simus,* the great short-faced bear.

INTRODUCTION

The late Pleistocene Carnivora of Little Box Elder Cave, Converse County, Wyoming, were described by Anderson (1968), who noted the presence of the grizzly or brown bear, *Ursus arctos* L. The material consists of a number of loose teeth and foot bones, most of which belong to a large form of this species. Extended comparison has shown, however, that at least one and probably two specimens must be referred to a distinct species and genus, the extinct short-faced bear, *Arctodus simus* (Cope). This is the first substantiated record of association between these two species of bears south of Alaska. The material is in the University of Colorado Museum (UCM), Boulder.

MATERIAL

Ursus arctos L., Brown bear

UCM 22289, right M_1. This tooth belonged to a young individual and shows hardly any trace of wear. The posterointernal

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part of the talonid has been lost. The remainder of the tooth is well preserved and is similar to the M_1 in Recent *U. arctos* from Alaska except for its somewhat larger size (Table 1). The lower carnassial of *Arctodus simus,* in possessing a powerful trenchant trigonid, differs markedly from the specimen at hand, and is also considerably larger, as shown in Table 1.

UCM 49–40 and 22290, left and right M_2. As in No. 22289, these two teeth are quite unworn and probably belonged to the same individual. The left tooth is much damaged, while the right one is intact except for a missing piece of the protoconid, and the loss of the anterior root. This root, however, is preserved in the left M_2. As far as can be seen from the preservation, the two teeth are mirror images of each other.

The occlusal surface is strongly marked, with large, well-developed cusps delimited by furrows. Protoconid, metaconid and entoconid are all duplicated; the two cusps in a pair are subequal in size except for the protoconid, where the anterior cusp is noticeably bigger. The posterior rim of the tooth forms a small hypoconulid. A well-developed external cingulum curves around the hind edge of the tooth; there are no cingula in front or internally.

Despite its large size, approximating to the average in *A. simus,* M_2 has typical *U. arctos* characters. The second molar of *A. simus* differs in being narrow posteriorly, in lacking an external cingulum, and in having a markedly inward slope to its outer wall, as well as in various morphological details of the occlusal surface.

Although these M_2 are larger than those of present-day Alaskan *Ursus arctos,* late Pleistocene specimens of comparable size are known from Alaska (Table 2). An analogous decrease in size within *U. arctos* since late Pleistocene times has been documented in Europe (Kurtén, 1959, 1968).

USM No. 52–73, first phalanx, probably from the manus. The relatively small size of this bone, which has a length of 37 mm and measures 11.6 mm transversely in the middle, leads us to regard it as most probably being *U. arctos.* It agrees in size with those of present-day grizzly bears.

Arctodus simus (Cope), Short-faced bear

UCM 22288, left M^2. This tooth belonged to an old individual, and the four principal cusps have worn down to the same level as the cuspules. The anteroexternal corner of the tooth, the inner and outer roots, and some other portions of the crown have been lost; the anterior and posterior roots are preserved.

In spite of the damage, there can be no doubt about the characteristic outline of the *Arctodus* M^2. It is approximately triangular in shape, being broad in front and tapering rapidly posteriad; the inner wall is straight but the outer wall has a rounded bulge at the base of the metacone. In *Ursus arctos,* M^2 is a relatively longer and narrower tooth, and is not similarly tapered towards the hind end of the talon. The specimen matches closely the M^2 in specimens of *Arctodus simus* from Alaska with which it has been compared. Its size is close to the average for *A. simus* from Potter Creek Cave, California (Kurtén, 1967; see also Table 3).

UCM No. 7–56, left pisiform. The morphological characters and relatively slender build of this bone lead us to refer it to *A. simus.* It compares closely with the specimen from Rancho La Brea figured by Merriam and Stock (1925), and deviates in various respects from a specimen of *U. arctos* of comparable size; the last mentioned is conspicuously heavier in build, as shown by the measurements (Table 4). In No. 7–56, the shaft is slenderer and the distal boss much more flattened than in *U. arctos.* The size of the specimen is about the same as in *A. simus* from Rancho La Brea and Frankstown Cave (see Kurtén, 1967:35, Table 14).

DISCUSSION

The bear fossils were found at various levels and locations in the cave. As Anderson (1968) pointed out, there has been some reworking of the unconsolidated deposit by rodents, especially *Neotoma cinerea.* This probably accounts for the fact that the two brown bear M_2 lay at different levels. The age of the fauna as a whole is late Wisconsin.

As far as we know there is no other locality south of the Fairbanks District, Alaska, that shows an association between these two species. *Ursus arctos* has been reported from the Rancho La Brea tar pits, which have also yielded *A. simus,* but as shown by Kurtén (1960) the only specimen definitely referable to the former comes from the postglacial Pit 10, where the short-faced bear is not present. The ursine bear of the main Rancholabrean fauna is the black bear, *Ursus americanus* Pallas, of which a very large form was present in North America during the Wisconsin. Its large size has led to confusion with the grizzly bear.

We suggest that *U. arctos* entered western United States at the end of the Wisconsin glaciation, presumably through the corridor between the Cordilleran and Laurentide ice fields, from Alaska, which it had colonized some time earlier. Once it had penetrated south of the ice sheet it extended its range far beyond its limits in historical times, as shown by finds in eastern Canada and the United States (Guilday, 1968). The great short-faced bear may have become extinct either as a result of competition with *U. arctos* or because its prey became extinct, or for some other reason; but the exact date of its extinction cannot yet be stated.

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ABBREVIATIONS

The following abbreviations are used in the tables:

F:AM — Frick Collection, American Museum of Natural History, New York.
LBEC-UCM — Little Box Elder Cave, University of Colorado Museum, Boulder.
USNM — National Museum of Natural History, Washington, D. C.
M — Mean
N — Number in sample
O.R. — Observed Range
S.D. — Standard Deviation

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Table 1. Measurement of M_1 in *Ursus arctos* and *Arctodus simus*.

	N	O.R.	M	S.D.
Trigonid length				
U. arctos				
Recent, Alaska — USNM	40	14.3–17.0	15.90 ± 0.09	0.60
LBEC UCM 22289	1	–	18.0	–
A. simus				
Pleistocene	18	21.8–26.1	23.01 ± 0.33	1.42
Trigonid width				
U. arctos				
Recent, Alaska — USNM	40	8.2–11.1	9.94 ± 0.11	0.68
LBEC UCM 22289	1	–	11.0	–
A. simus				
Pleistocene	20	14.1–16.8	15.50 ± 0.16	0.73

Table 2. Measurements of M_2 in *Ursus arctos*.

	LBEC UCM 22290	Pleistocene, Alaska F:AM A-200-6671
Length	30.6	32.3
Anterior width	19.5	19.5
Posterior width	20.0	20.8

Table 3. Measurements of M^2 in *Arctodus simus* and *Ursus arctos*.

	N	O.R.	M	S.D.
Length				
A. simus				
Pleistocene	27	33.3–41.4	37.60 ± 0.4	2.1
LBEC UCM 22288	1	–	35.5	–
U. arctos				
Pleistocene, Alaska	1	–	45.0	–
Anterior width				
A. simus				
Pleistocene	27	21.3–25.8	23.66 ± 0.23	1.20
LBEC UCM 22288	1	–	ca. 22.5	–
U. arctos				
Pleistocene, Alaska	1	–	24.0	–

Table 4. Measurements of Pisiform Bone in *Arctodus simus* and *Ursus arctos.*

	A. simus LBEC UCM 7-56	*U. arctos* USNM 199252
Greatest length	56.0	54.0
Greatest proximal diameter	31.0	32.0
Distal boss, long diameter	34.3	30.7
Distal boss, short diameter	18.5	21.8
Least width of shaft	15.4	16.8